Claims:

1. A method for controlling the electrolytic process in an electrolytic plant, in which method the process statuses are interpreted on the basis of physical and chemical measurements, and the electrolytic process control parameters are adjusted in order to prevent and eliminate fault situations,

characterized in that

the process and control data collected from the process in a long time span is transformed into mathematical models and inference algorithms, which are recorded in the computer memory,

periodically and regularly during the process, there are calculated, by means of the created models and inference algorithms as well as real-time process measurement data, one or several indexes describing the process status, in which case

– a theoretical cell voltage at a known point of time is defined by means of process measurements and an empirical model,
– the real cell voltage is measured at said point of time,
– the difference between the theoretical and real voltages is calculated, and the difference value and said point of time are recorded in the computer memory, and there is formed a trend of the difference,
– the trend of the difference in the voltages is interpreted by means of a mathematical model,
– the interpretation of the trend of the difference is transformed, individually for each cell, into a status index describing the momentary status of the process by means of fuzzy and logic inference algorithms,

and when one or several of the calculated indexes deviate from the predetermined values, the process control parameters are adjusted for controlling the process.

2. A method according to claim 1, **characterized** in that the cell specific index relates to a unit of one or several electrolytic cells that has undergone a cell voltage measurement.

3. A method according to claims 1 and 2, **characterized** in that the created status index and the process measurement parameters are also transformed, by means of a fuzzy inference algorithm, to a condition index describing the development of the status of the process during a longer stretch of time.

4. A method according to claim 1, **characterized** in that the status index obtains a value between 0 and 1.

5. A method according to any of the preceding claims, **characterized** in that the index is a cell condition index, in which case the age of the cathode in the cell is taken into account when calculating the index.

6. A method according to claim 1, **characterized** in that the index is a discreet status or event data, in which case in the calculation of the index, there is first calculated a cell specific status index describing the momentary status of the process, said status index being formed by means of fuzzy and logic inference algorithms, and on the basis of said status index and real-time process measurements, there is created said status or event data.

7. A method according to claim 1, **characterized** in that the process and control data comprises cell voltage, electrolyte temperature, electric current supply, electrolyte composition, electrolyte flow and additive supply.

8. A method according to claim 1, **characterized** in that when forming the model used in the interpretation of the trend of the difference, the

required process and control data is collected during a period of at least half a year in ten minute averages.

9. A method according to claim 1, **characterized** in that in the calculation of the theoretical cell voltage, there is used a multivariable regression model formed in separate laboratory tests.

10. A method according to claim 9, **characterized** in that the input variables in the regression model represent, apart from the process and control data values, the cell voltage.

11. A method according to claim 1, **characterized** in that the interpretation of the difference in the cell voltage is carried out by a principal component analysis model formed of the theoretical and cell voltage data.

12. A method according to claim 1, **characterized** in that the fuzzy model used in the calculation of the status index describing the momentary status of the process is a model of the Mamdani or Singleton type.

13. A method according to claim 12, **characterized** in that the employed feed for the fuzzy model used in the calculation of the status index, describing the momentary status of the process, constitutes the most significant principal components of the principal component analysis.

14. A method according to claim 12, **characterized** in that in the Mamdani type rule base, there is included process knowledge, so that the condition index corresponds to the real process status by respective values of the feed variable.

15. A method according to claim 1, **characterized** in that on the basis of the method indexes and information, there is controlled the electrolytic

process short circuit work in the electrolytic plant, the use of cell hoods, the maintenance of conducting rails, the control of the electric current supply into the cell groups, the correctness of the cell specific solution supply, the regulation of the additive feed and the flow-through of the electrolyte in the cells.

16. A method according to claim 1, **characterized** in that the models or inference algorithms used for calculating the indexes represent real-time calculation software.

17. A method according to any of the preceding claims, **characterized** in that the calculated indexes are recorded in a database.

18. A method according to any of the preceding claims, **characterized** in that the calculated indexes are recorded in an automation system.

19. A method according to any of the preceding claims, **characterized** in that the status, status class and condition index data is presented through a www server that is located on the computer used for creating said indexes.

20. A method according to any of the preceding claims, **characterized** in that the method is used for controlling the electrolytic processes of copper, nickel and zinc.